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Patent claims

1. System for inspecting matt, flat and/or slightly curved surfaces in order to identify defects which are associated with a modification of the course of the surface, in particular for examining matt unlacquered shell bodywork, in which system an illumination device (2) irradiates the surface (3) to be inspected at flat angles, said device having the following combined features:
the illumination device (2) is formed from a plurality of elongated luminous surfaces (5) which are disposed substantially parallel to one another,
the angle between the normal line of an inspected surface element on the surface and the connecting line between the inspected surface element and a point on one of the elongated luminous surfaces (5) is greater than approximately 60°,
the light distribution of the respective elongated luminous surfaces is tightly concentrated in planes which lie transversely with respect to the longitudinal direction of the respective surface, with an aperture angle which is smaller than 15°, in such a way that a substantially sheet-type light distribution is produced which covers the surface portion to be inspected, and the observer (4) is located within or at least in the proximity of the angle predetermined by reflection of the light radiated by the at least one elongated luminous surface on the surface portion to be inspected.

2. System according to claim 1, **characterised in that** the aperture angle of the sheet-type light distribution is smaller than 5°, preferably smaller than 2°.

3. System according to claim 1 or claim 2, **characterised in that** the angle between the normal line of an inspected surface element and the incident light ray of the elongated luminous surface is greater than 75°.

4. System according to one of claims 1 to 3, **characterised in that** the longitudinal direction of the luminous surfaces (5) is substantially parallel to the longitudinal direction of the surface (3) to be inspected which is illuminated by this luminous surface.

5. System according to one of claims 1 to 4, **characterised in that** each surface portion to be inspected is illuminated by at least one elongated luminous surface (5) from its entire length and breadth.

6. System according to one of claims 1 to 5, **characterised in that** the luminous elongated surfaces (5) so disposed beside one another are so arranged in respect of their concentration that they illuminate adjacent surfaces to be inspected in the same alignment.

7. System according to one of claims 1 to 6, **characterised in that** the illumination device (2) has a light-radiating original surface (11, 15) which has a substantially uniform luminance distribution and in that there is arranged in front of this original surface a plurality of lamellae (13) which are substantially parallel to one another and which determine the desired aperture angle on the basis of their geometry.

8. Illumination device according to claim 7, **characterised in that** the surfaces of the lamellae (13)

have a high reflection factor of the directed reflection at flat light entrance angles, and at steep light entrance angles reflect predominantly in a diffuse manner.

9. System according to claim 7 or 8, **characterised in that** the surface of the lamellae (13) is black.

10. System according to one of claims 7 to 9, **characterised in that** the gaps between the lamellae (13) are filled with a light-guiding transparent medium, and in that the surface of the lamellae (13) is connected to the medium in an optically dense manner at least on one side.

11. System according to one of claims 1 to 10, **characterised in that** the observer is a person, a camera or some other sensor arrangement for capturing an image.

12. System according to one of claims 1 to 10, **characterised in that** the light-radiating original surface radiates at a solid angle which is greater than the solid angle of the radiation of the luminous surfaces (5).

13. System according to one of claims 1 to 12, **characterised in that** the illumination device has at least one elongated light source (12, 14), the light distribution of which radiates widely in planes parallel to its axis.

14. System according to one of claims 1 to 13, **characterised in that** the original surface (12) is composed of a plurality of widely radiating, elongated light sources which are disposed beside one another, at least one pair of lamellae (13) being placed in front of each light source.

15. System according to one of claims 1 to 13, **characterised in that** the original surface is formed from at least one elongated light source (14) with a trough-like reflector (15).

16. System according to one claims 1 to 13, **characterised in that** the position of the observer can be altered by optical measures such as mirrors, retro-reflective materials or prisms.